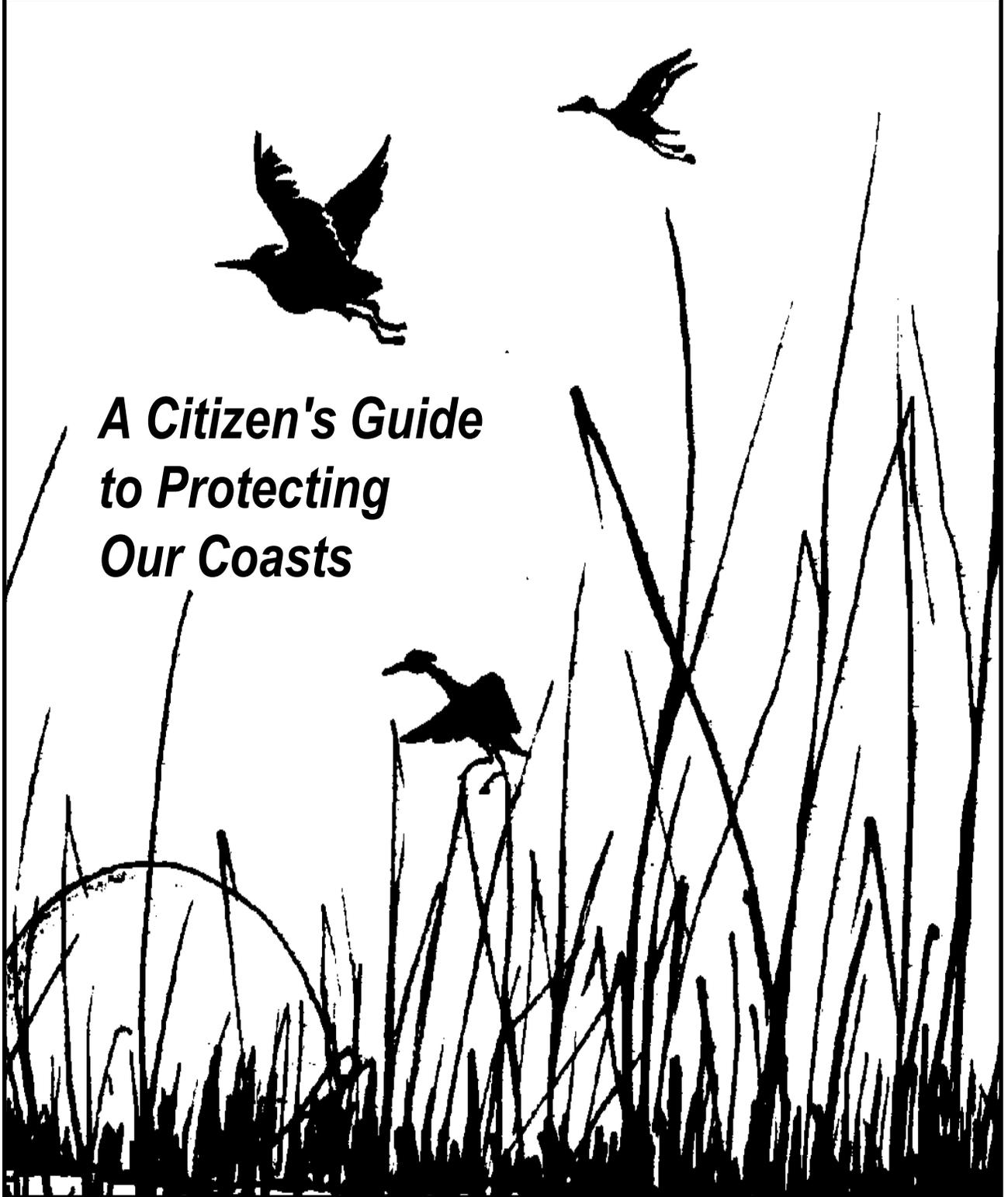


KEEP IT CLEAN!

*A Citizen's Guide
to Protecting
Our Coasts*



BEFORE YOU TURN THE PAGE...

Do you use common household products such as laundry detergent, drain cleaner, air freshener, furniture polish, floor wax, paint, rust remover, glue and batteries?

Do you water the lawn? Do you use fertilizer and pesticides in yard care or gardening?

Does your home run on a septic system?

Do you drive a car? Do you do your own auto maintenance and change the oil in your car?

Do you have pets or an aquarium?

Do you have a backyard swimming pool?

Do you live on waterfront property?

Do you fish or play golf?

Do you own a boat or an all-terrain vehicle?

Do you enjoy going to the beach, on picnics, or camping?

Do you vote?

If you answer “yes” to any of these questions,

Then...

The information in this book applies to all of us...YOU, TOO!

Is there a common thread to the above questions? They all have to do with what individuals can do to help prevent water pollution. Most of us would like to do more for the environment. This book gives you the opportunity to do just that!

To find out more about water pollution, how individuals can make a difference, and some helpful hints on using this book, turn to the **PREFACE**.

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PREFACE

Most of us are aware that water pollution is a problem, but we feel comfortably removed from it. Yet water pollution knows no boundaries. The water we use in our homes is ultimately released as wastewater. Eventually it finds its way into our rivers, lakes, oceans, or the aquifers storing our groundwater.

Sources of Water Pollution ~

Most of us associate pollution with large cities. We think of smokestacks spewing out fumes, antiquated sewage treatment plants, and outfall pipes discharging industrial wastes directly into a river or lake. A significant amount of water pollution comes from this type of “point source” pollution, or pollution from a particular site, such as a factory.

However, if every city plant and industry were to shut down and stop discharging wastes for one day, over half of all today’s pollution would continue to reach our rivers, lakes, and estuaries! The U.S. Environmental Protection Agency estimates that **60%** of the remaining water pollution in the U.S. can be attributed to nonpoint sources!

“Nonpoint source” pollution comes from the kind of everyday activities that no one thinks twice about, such as driving to work, cleaning with household chemicals, and applying fertilizer and pesticides to lawn and garden. The seemingly innocent chemicals and fertilizers are carried into streams, rivers, lakes and bays with the rain. For this reason, nonpoint source is also called runoff pollution.

Runoff moving across the ground may also sink into the soil and contaminate groundwater resources. Pollutants found in groundwater include pesticides from agriculture, petroleum products from gasoline storage areas, heavy metals from motor vehicles, and nitrates, bacteria, and viruses from septic systems. Rainwater percolating through older, unlined landfills can leach any number of highly concentrated, toxic chemicals and carry them to the groundwater.

Can One Person Really Make A Difference? YES!!!

Today a young mother with toddler in tow, a couple of homeowners, a landscape architect, a local scout troop, and the board member of a condominium association all made a difference.

- The young mother flushed the contents of her child’s disposable diaper down the toilet before putting it in the trash. The waste goes into a sewage system instead of the landfill where it could potentially contaminate groundwater with bacteria and viruses. By using a diaper service and using disposable diapers minimally, she practices water conservation and helps reduce the solid waste stream at the landfill.

- The homeowners removed a discarded car battery containing acid and heavy metals from the creek behind their home. Canoeing on a regular basis allows them to keep an eye out for pollution.
- By using native plants, the landscape architect practices water conservation and helps keep surface and ground waters free of fertilizer and pesticides.
- Well aware that plastic items and other marine debris can harm or kill marine mammals, the scout troop meets at the beach and collects litter as part of an Adopt-A-Beach program.
- The condo board member implemented a recycling program in all buildings. The information he provides to new residents helps them to become acquainted with the environment. By attending planning board and county commissioner meetings, he keeps informed on important local environmental issues and shares the information through the condo's newsletter.

Since Water Is A Shared Resource, Preventing Water Pollution Is A Shared Responsibility

Legislation like the U.S. Coastal Zone Management Act of 1972 addressed the need to protect the nation's inshore marine habitats and established the National Estuarine Research Reserve system under the direction of the National Oceanic and Atmospheric Administration (NOAA). NOAA is responsible for designating estuaries as reserves and administering the system in cooperation with state governments.

Without the help of individuals and a greater community effort, the U.S. coast and the great wealth within its waters will decline. When people work together, the results can be astonishingly successful. Just imagine saving 30 gallons of water in your home each day. Your new water-conserving habits are magnified enormously when 100 other people in the neighborhood get behind the project and do the same. Together you have saved over 3000 gallons of water!

How To Use This Book

We pollute our environment every day in small ways without giving a thought to what we are doing. We often end up polluting our environment by how we care for it. Carelessly using something as simple as soap in our homes or fertilizer on our lawns affects the people who live downstream and impacts all other life downstream as well. An “environmental audit” is the first step to becoming environmentally responsible. Careful examination of our daily routines may reveal that the some of the most ordinary things we do are also the most harmful!

This book can assist you with your own environmental audit.

Used as a guide, this book can help you determine if what you are doing has a positive or negative impact on our waters. Each chapter and individual sections within chapters give background information on pollution problems associated with that chapter or section. For example, the Lawn Care, Landscape, and Gardening chapter has information about stormwater runoff as well as fertilizer and pesticides. Background information is not meant to overwhelm or discourage the reader. It is intended to further your understanding of the environment, in your own space (inside and outside of the home) and the U.S. coast.

Key concepts are in bold print to alert you to the most important points. Refer to the Appendix for further sources of information.

The book suggests steps that the average citizen can take to help solve water pollution problems. But many other possibilities are open and waiting to be explored. Some suggestions will be useful to you, others will not. Use what best fits your personal circumstances. You may come up with a few creative ideas of your own, too, and we would like to hear from you.

AT HOME

Preventing water pollution in and around our homes begins with taking an inventory of common household products and cleaners that we use every day. Look under the kitchen and bathroom sinks, check the laundry and utility room, and survey the shelves and corners of the garage, workshop, and storage closet. Most of our homes will turn up a small chemical arsenal.

Oven, drain, and toilet cleaners contain the caustic base lye (sodium hydroxide). Laundry detergents, abrasive cleansers, and mildew removers contain bleach (sodium hypochlorite). Cleaners that dissolve hard water scale deposits contain sulfamic and hydroacetic acids. A diverse array of aerosols, automotive products, bug sprays, metal, floor, and shoe polishes, floor care products and pesticides are high in carbon-based (organic) compounds. Petroleum distillates make some products flammable. Some of the most toxic household products are those used in home maintenance and repair including paints, preservatives, strippers and thinners, glues, and varnishes.

Many common household products contain petroleum-based chemicals and other non-biodegradable ingredients. The garages, basements, and attics of older homes may be filled with products that have been sitting for decades. Older pesticides may contain active ingredients which are now considered too risky for consumer use. Homes with pools, boats, and gardens add more chemicals to the inventory as do those households whose members are pursuing painting, ceramics, or photography.

Most people take extra precautions with strong household cleaners, chemicals, and other substances that could potentially poison or harm children and pets. Few people think twice about pouring chemicals down the drain, flushing them down the toilet, dumping them on the ground, or hosing them off the driveway. We don't stop to consider the dangers when we dispose of "empty" containers by setting them out for garbage pick-up.

Cans and other containers with residual chemicals that are trucked to landfills could potentially leach toxins into the air, soil, groundwater, and eventually the food chain. In the case of incinerators, gaseous emissions and other fine particulate matter have the potential to contaminate air and surface waters.

The improper storage of toxic ash has the potential to pollute groundwater. We can no longer take for granted the ways in which we use and dispose of hazardous household chemicals. We can significantly reduce the impact of hazardous chemicals in a number of ways.

HOUSEHOLD CHEMICALS

Check the appendix for nontoxic substitutes for household chemicals!

When purchasing household chemicals:

- **Buy nonaerosol sprays and biodegradable products that come in recyclable containers.**
- **Buy rechargeable batteries.** Nickel-cadmium batteries are more expensive than alkaline, but can be recharged up to 100 times which saves money in the long run and keeps toxic metals out of the local landfill or incinerator.
- **Buy multi-purpose products.** Look for the non-phosphate, biodegradable laundry detergent that cleans and bleaches and the all-purpose household cleaner that can clean a variety of washable surfaces: walls, tiles, floors, counter tops, glass, ceramics and wood.

When using household chemicals:

- **Use the product only as directed and only when needed.**
- **Read the label carefully so potential hazards are understood.** Take appropriate precautions (opening windows for adequate ventilation, wearing protective gloves or goggles, removing food and dishes, etc.).
- **Follow the directions for the amounts needed.** More is *not* better. More will not clean faster and may even create problems. Continuing to dump lye drain cleaner down a clogged drain after the initial application fails to open it can damage pipes or the septic system. A plumber's metal snake may be needed to open the drain.
- **Keep sand, kitty litter, sawdust or some other absorbent material on hand to clean up spills.**
- **Never use chemicals around wells, septic systems, cisterns, or waterbodies.**
- **Household products should be stored in their original containers with labels intact for easy referral. Never remove a label.** Transferring a toxic toxins are chemically incompatible with materials from which containers are made (certain plastics, for example), and will dissolve or melt the container.
- **Never mix household products together or use simultaneously. Dangerous chemical reactions can occur. The combination of ammonia and chlorine bleach produces deadly chloramine gas.**

Read the label

The label should list the ingredients, instructions for use, storage, and disposal, potential hazards and warnings. Compare a number of products, select the least toxic product, and buy only the amount needed.

When storing or disposing of household chemicals:

- **Store products with lids tightly closed.** Harmful fumes may escape from an open container; acid may splash the person who reaches for the container.
- **Unused or partially used paints and decorating supplies can be donated to local organizations** such as theater groups or to a hazardous waste collection exchange program. If leftover paint cannot be used, place the opened can in a well-ventilated, safe place (preferably outdoors). After the contents solidify, stuff the can with old newspapers, seal the lid, and set out for urbside trash collection. Paint thinner, turpentine, mineral spirits, and brush cleaners containing solvents can be recycled by storing in a closed container until particles settle out. The liquid solvent should then be filtered into a separate labeled metal container and stored for future use. The container with the sludge should be taken to a hazardous waste collection center.
- **Never burn or bury unused chemicals or their containers.**
- **Never dispose of paints, preservatives, thinners, brush cleaners, or other solvents by pouring them down the drain, on the ground, or into a street or storm drain.** Some of these products contain the suspected carcinogen methylene chloride, toluene, and other toxic chemicals. Disposing of these chemicals carelessly could destroy the beneficial bacteria of septic systems and sewage treatment plants. Septic systems and sewage plants are not able to break down hazardous wastes completely, so some toxins are carried into area surface and ground waters.
- **Do not use wood preservatives containing creosote, pentachlorophenol, or arsenic.** Leftover wood preservatives, treated scrap wood, shavings, and sawdust should be delivered to a hazardous waste collection center.
- **Consider the use of nontoxic alternatives in place of toxic household cleaners.** Simple ingredients such as soap, baking soda (sodium bicarbonate), washing soda (sodium carbonate), borax, distilled white vinegar, lemon juice, and ammonia can be safe, effective, and economical. Refer to the Appendices for a complete list of products and the traditional cleansers and natural alternatives that can be substituted for those products.

Store products in the original containers

Store them in a safe well-ventilated place, out of direct sunlight and in areas not subject to temperature extremes. Store products out of the reach of children.

Cleaning with some of these natural household products may require a little more effort and possibly more frequent cleaning in some instances. Cutting down on the number of hazardous household products we currently use has important benefits. The possibilities of accidental poisoning and long-term exposure with unknown side effects are lessened, the threat of pollution to our environment is reduced, and the amount of empty containers which are piling up in our landfills is diminished.

SEPTIC TANKS

Water pollution from malfunctioning septic systems is a major problem. The U.S. Environmental Protection Agency reports that septic systems are the most frequent sources of groundwater contamination.

Septic systems, when properly designed, installed, and maintained can provide cost-effective treatment of household sewage and many years of dependable service with little adverse impact on the environment.

Because septic systems are underground, they are often forgotten or ignored by homeowners. Problems arise when people neglect normal maintenance procedures.

When a septic system malfunctions, it loses the ability to remove pollutants and disease-carrying microorganisms from wastewater. The virtually untreated water pollutes groundwater and deep wells which we use for drinking water and other household needs. Surface waters, near-shore areas, streams, and estuaries may also be contaminated from leaking systems.

When your septic system fails, you also face plumbing back ups, overflows, expensive repair costs and very serious potential threats to human health. Our domestic wastewater contains bacteria and viruses that cause hepatitis, dysentery, and other gastrointestinal infections. Although typhoid fever rarely occurs in the U.S., it can be transmitted through sewage.

Responsible Use and Maintenance of a Septic System

Caring for your septic system will minimize potential problems. Responsible use and maintenance will keep your septic system operating smoothly and help prolong the life of the system. Remember: whatever is rinsed down the kitchen sink or flushed down the toilet ultimately makes its way into the soil and groundwater or remains in the septic tank until the tank is pumped.

- **Know the location of all parts of your septic system.** Check your septic tank for accumulation of sludge and surface scum on an annual basis. Most state certified, licensed septic companies will do a free inspection as a courtesy service. If the bottom of the surface scum is within three inches of the tank's outlet pipe, the tank needs to be pumped and cleaned.

A reputable contractor should remove sludge and scum *every three to five years*, although the intervals vary depending on the system's frequency of use and some systems may operate satisfactorily for a longer period of time. Removing sludge and scum ensures an adequate volume of wastewater in the tank and prevents solids from washing out into the soil absorption system where they could clog the soil absorption field.

- **Keep the septic tank and adjacent soil absorption area clear of heavy vehicles which could compact the soil or collapse the drain lines.** No structures should ever be built over the septic system. The drainfield needs to “breathe” and should not be covered by any hard surface such as a patio, tennis court, or driveway.

Do not plant trees or shrubs near the system as roots can work their way inside pipes and clog the drain lines. The yard space above the drainfield should be maintained with healthy grass and native plants.

Be aware that some species of grass can create a problem by growing as a mat and effectively sealing the drainfield so it cannot breathe.

- **Do not use septic tank additives or cleaning compounds which are promoted by manufacturers to aid biological decomposition in the tank or eliminate the need for sludge to be removed.**

Yeast, bacteria, and enzyme additives and chemical treatments are unnecessary, and there is no evidence that they improve the system or prevent system failure. Using these products may cause the tank to work less efficiently, damage the drainfield, and may contaminate groundwater and drinking water drawn from area wells.

- **Minimize or eliminate the use of the kitchen garbage disposal.** Using a garbage disposal can increase the solids load to the septic tank by as much as 50%. *Never pour grease, cooking oils, fats, or gristle down the sink drain or through the garbage disposal.* Dispose of grease by absorbing it in paper and putting it in the garbage for sanitary landfill collection.

Successive deposits of solidified fats will build up and obstruct parts of the system. Organic garbage such as vegetable pieces and fruit peelings can also burden a system. These materials should be put in a compost pile or set out for curbside garbage pick up. A kitchen sink strainer also helps reduce the amount of food waste entering the septic tank.

Burdening a system incurs more frequent servicing and increases maintenance and repair costs. Limit solids, such as food scraps in the kitchen and paper products in the bathroom.

- **Do not pour common household chemicals down the kitchen sink or toilet.** Avoid using strong detergents, solvents, and disinfectants. They can destroy the beneficial bacteria which are actively decomposing sewage and are essential for the septic system to function properly.

**Don't use
the toilet or sink
as a trash can**

*The following substances should **NOT** be disposed of in home plumbing:*

- *cigarettes,*
- *facial tissue,*
- *feminine hygiene products,*
- *paper towels,*
- *disposable diapers,*
- *condoms,*
- *dental floss,*
- *cat box litter,*
- *coffee grounds,*
- *grease and*
- *other organic wastes.*

Disposal of these items adds to the solids load, fills the tank more rapidly, and decreases its efficiency.

Drainfield failures may be related to reduced bacterial activity as a result of continued, frequent use of strong chemicals such as bleach, lye, and drain-cleaning solutions of sodium hydroxide.

Minimal use of household cleaning agents such as mild detergents, soaps, and bleaches should *not* harm a system. Dump cleaning water in the yard, not down the sink. Avoid using water fresheners and strong chemicals in toilets, and, whenever possible, use toilet paper that has not been bleached, dyed, or perfumed.

- **Use phosphate-free laundry and dishwashing detergents, biodegradable cleaning products, and natural substitutes that will not damage the septic system.** Low phosphate products will cut down on the influx of nutrients which contribute to algal blooms and oxygen depletion in area waters and other serious water quality problems.
- **When building a new home and installing a septic system have a state certified, licensed contractor evaluate the site and provide an explanation of such factors as soil permeability, water table elevation, and the size of the drainfield.**

Failures resulting from construction problems usually appear right away. Broken or disconnected pipes, a tilted distribution box, smeared trench walls, or the use of unsuitable filter media such as unwashed gravel in the trenches, will cause effluent to rise and pond shortly after your family begins occupancy.

- **Older homes may be equipped with smaller septic systems which simply cannot handle the large amounts of water modern appliances use.** Running a garbage disposal, dishwasher, and washing machine, can involve such a heavy increase in the use of household water that the drainfield becomes saturated and forces water to the soil surface.

When you remodel your home, add a new addition, or increase your family size, evaluate your septic system; it may need to be enlarged.

- **Direct rain runoff from roof downspouts and foundation drains away from the septic system and drainfield to avoid saturating the soil.** Refrain from watering the lawn or vegetation over the drainfield. This area already receives all the water it needs.
- **Conserve water.** Water flow to the septic system can be substantially lowered through water conservation. Leaking faucets and toilet tanks can eventually saturate the soil absorption field. For more information on steps you can take to save water, refer to the following section, Water Conservation in the Home.

Keep toxic
chemicals and
hazardous wastes
out of
septic systems.

Strong chemicals not only kill the bacteria necessary for the health of the system, but they also create the added risk of leaching into underground water sources and contaminating wells and groundwater.

Signs of Septic System Failure

Very specific signs indicate problems or potential problems within a septic system. The minor, nuisance problem a homeowner lives with today can build into a problem of major proportions over time, if ignored. Discovering a problem and correcting it before it becomes serious makes for an easier solution.

Homeowners should be particularly aware of the following warning signs:

- **Sluggish flow from the drains in the house and sluggish toilet flushes accompanied by gurgling sounds in the plumbing.** Do sinks seem to take longer to empty? Does the shower stall fill up with water? Are all the drains in the house slow or just one? If only one drain or room is affected, a single clogged pipe inside the home may be responsible. However, if all kitchen and bathroom drains are slow, the problem is likely to be within the septic system.
- **Patches of lush, green grass in the yard indicate the system is allowing effluent to rise near the surface.**
- **Effluent rising to the ground.** *Wastewater seeping up onto the lawn and forming puddles is very serious, because children might play in them by mistake.* Effluent rising from trenches will appear as a gray-black liquid flowing across the ground or into a low spot or roadside drainage ditch. The liquid will be clearly visible and have an unpleasant smell.
- **Ground which is soft and spongy underfoot and the appearance of low spots or depressions in the soil indicate that there is poor drainage and the soil is becoming saturated.** Poor drainage due to an undersized or improperly installed system, one located in the wrong kind of soil, or a drastic increase in water use may be responsible for drainfield failure.
- **One final note: high water tables can impede drainage.** If the groundwater moves into the soil absorption system, effluent can be forced up towards the ground surface before pollutants and organisms are removed, or the wastewater can be carried along with the groundwater and travel long distances from the absorption area. It is essential that a sufficient depth of soil exists between the bottom of the drainfield trench and the seasonal high water table.

Obvious symptoms

Noticeable odors inside or outside the house and plumbing back ups indicate septic system problems.

HOME WATER CONSERVATION

Water is an essential resource...necessary for agriculture, industry, recreation, the environment, and all life. Water conservation is the responsibility of all users including individual homeowners. *Wise water use is crucial to the country's environmental health and general well-being.*

Reducing water consumption saves money. Residents who are on a municipal water system pay for pumping, treating, and distributing water to users. Wastewater treatment bills may be based on the quantity of water used. People in rural areas may have good well water available, but they must pay for the installation, operation, and maintenance of a pump.

Most of us use far more water than we need. An average household uses between 60 to over 300 gallons per person per day! By practicing water conservation, we can reduce the amount of water use in our homes between 30 to 40%!

Important ways to conserve water include the following:

- **Use water-saving, flow-restricting shower heads, low-flow faucets, toilet flushing devices, and other water-saving appliances.**
- **Reduce the amount of water used for flushing toilets.** Place two half-gallon plastic milk jugs (cleaned and partially filled with gravel or stones to add weight) inside your toilet tank where they do not interfere with flushing mechanisms. The bottles displace certain amount of water which refills the tank and cuts down the number of gallons used per flush.
- **Repair leaky faucets, pipes, and toilets promptly.** A steady drip can waste as much as 20 gallons in one day, 600 gallons in one month! Water leaking from the toilet tank into the bowl can waste between 200 and 500 gallons of water in one day! Check your toilets by adding food coloring to the tank. If color appears in the bowl after half an hour elapses without any flushing, you have a leak. Leaking faucets and toilet tanks can eventually saturate the drainfield of a septic system. Worn out faucet washers and faulty toilet valves account for 5 to 10 % of all residential consumption.
- **Run the dishwasher only when fully loaded.** Use the energy and water-saving cycles with short washes and rinses. Dishwashers can use as much as 15 gallons of water. Water-saving cycles cut the amount by almost half. Dishes can be pre-rinsed or soaked in a stoppered sink instead of under running water.

Key Concept

Think about water conservation before turning on the faucet. A few simple changes in our everyday habits reduce water use and add up to save water.

Remember the Indian Proverb: *The frog does not drink up the pond in which he lives.*

- **Do laundry at intervals throughout the week instead of doing several loads all at once.** The greatest volume of water exiting a home in one surge is from the washing machine. Washers use between 30 to 50 gallons for a full load. Always turn the water level control to the appropriate setting (low, medium, high) to match the corresponding size load of clothes. Permanent press cycles use an additional ten to twenty gallons of water.
- **Explore recycling “gray water.”** If you have a large family requiring many wash loads, consider installing a separate gray or dual water system for bath/shower runoff. Gray water waste is non-sewage as opposed to black water waste from toilets and garbage disposals.
- **Use the garbage disposal only when needed or once at the end of meal preparation or dinner.** Garbage disposals require a large quantity of running water to operate. Sorting garbage for the compost pile and trash collection is better than sending it down the disposal.
- **Avoid running water continuously in the kitchen sink.** Rinse dishes, fruits, and vegetables in a bowl. Thaw frozen foods in a container of cold water, in the refrigerator, the microwave, or at room temperature. Keep a container in the refrigerator for cool drinking water.
- **Avoid letting the water run down the drain.** You can save between 10 and 20 gallons of water by turning off the water until it’s time to rinse while brushing teeth, shaving, or shampooing.
- **Take shorter showers.** Take a 3 gallon shower instead of a 30 gallon shower. If you're taking a bath, don’t fill the bathtub so full.
- **Sweep sidewalks and driveways rather than hosing them down.**
- **Wash the car using a bucket and a hose with a shut-off nozzle.**
- **Water the lawn, garden, and plants only when needed.** *For specific recommendations, see the Watering and Irrigation section under Lawn Care, Landscaping, and Gardening.*

AUTO CARE

Automobile Maintenance — Protect Your Own Safety As Well As That Of Aquatic Life

- **Maintain your vehicle and check the conditions of belts and hoses.** Check for fluid leaks. Replace hoses before they develop cracks and repair fluid leaks immediately.

- **Never pour or hose oil, antifreeze, or other automotive chemical down a storm drain or discard in a careless manner. *Recycling is a must and the only recommended way to dispose of used oil.***
Used oil should be taken in a labeled, sturdy container to a hazardous waste collection center, an oil recycling center, or to one of the many area service stations that recycles oil.

Key Concept
<i>Never pour or hose oil or antifreeze down a storm drain or discard in a careless manner. Recycling is a must.</i>

- **Antifreeze/engine coolant contains ethylene glycol, which is toxic to humans, fish, land wildlife, and poses a special threat to pets.** Cats and dogs that encounter a puddle of antifreeze, are likely to lap up the sweet-tasting liquid and die. Used antifreeze and other hazardous automotive products should be taken in labeled containers to hazardous waste collection centers. Used antifreeze may also be taken to a radiator specialist or to a local full service garage which has a used antifreeze storage drum.
- **Keep your vehicle in good operating order.** Drive a fuel-efficient car that uses unleaded gas and keep the engine well-tuned to limit pollutant emissions.

Specifics To Follow When Washing The Car To Conserve Water, Reduce Surface Runoff, And Keep Surface Runoff Clean

- **Wash your car only when necessary.**
- **Use non-phosphate or very low-phosphate, biodegradable, mild soaps or detergents.**
- **Use a bucket, sponge, and a hose with a pistol grip nozzle.** This kind of shut-off nozzle produces high pressure, but uses a low volume of water, and it can easily be attached to any standard garden hose.
- **Hosing down the car and washing the car in sections, followed by a quick final rinse is most efficient, conserves water, and limits surface runoff;** or use a commercial car wash that uses water efficiently, recycles water, and disposes of runoff properly.
- **Homeowners who have large expanses of yard can wash the car on the lawn and water the grass at the same time.** However, vary where the car is parked because always washing it in the same area may compact the soil. Never park over or near the septic tank system or drainfield.

PETS AND AQUARIUM PLANTS

Surface runoff flushes pet feces off sidewalks, streets, and gutters into storm drains and ditches and carries the waste into surface waters. Animal wastes contaminate surface waters with the nutrients nitrogen and phosphorus, and bacteria and viruses.

The keeping of large farm animals in rural areas requires care in handling manure. Ponds, lakes, and estuaries in urban areas that have populations of Muscovy ducks and other waterfowl can be contaminated by their wastes.

Help keep area surface waters clean by cleaning up after pets:

- **Bury wastes at least 6 to 8 inches below the soil surface and away from surface waters.**
- **Flush wastes down the toilet, if doing so won't stress a septic system.**
- **Pick up wastes and dispose of them in the trash.**
- **Use a "pooper scooper" when walking a dog on a paved surface.**
- **If you keep horses and other large animals, store manure on higher dry ground and spread manure at least 100 feet away from waterbodies.**
- **Refrain from feeding domestic ducks and other waterfowl in city parks and wildlife that may be using wetlands in urban areas.**

Another serious problem of U.S. waters, is the introduction of nonnative plants and animals in canals, streams, lakes, and estuaries. In the absence of native biological controls, these plants spread aggressively, outcompete and displace native species, and are controlled at great economic cost.

Help keep waters clear and free of exotic species:

Never empty an aquarium into an area stream, canal, or other waterway. Nonnative aquarium plants and animals are exotic and do not belong in coastal waters. Aquarium plants clog waterways and impede the flow of water. Aquarium fish may outcompete native fishes.

POOLS

Many people enjoy the pleasures of a backyard swimming pool. Pools require substantial chemical treatment, particularly chlorine, to keep the water bacteria-free. *Chlorine and other pool maintenance chemicals should never be drained directly into a street or waterbody.*

Help prevent water contamination by taking these precautions:

- **Drain your pool only when necessary.**
- **Never drain the pool during periods when water restrictions are in place.**
- **Allow pool water to stand for several days without any new addition of chemicals before draining, as chlorine dissipates rapidly.**
- **Drain the pool slowly over a large expanse of yard so the water filters evenly down through the ground and is absorbed by the soil.**
- **Take swimming pool chemicals and containers to a hazardous waste collection center.**

LAWN CARE, LANDSCAPING AND GARDENING

Being healthy does not always mean having the greenest yard on the block! Cutting the grass too short, overwatering, and using too much fertilizer and too many pesticides are the most common mistakes in yard care. A manicured, weed-free, emerald green lawn is not always environmentally sound.

LAWN AND LANDSCAPE

An unlandscaped property is more vulnerable to heavy storms than landscaped ground. The undesirable end results are larger volumes of runoff, increased soil and channel erosion, and lost sediments washing down a storm drain or settling in an area waterbody.

- **Avoid cutting the grass too short.** Mowing your lawn too low can stress the grass, encourage weeds, invite pests, and ruin a lawn. Increased blade height allows the plant to develop a deeper root system. Adjust frequency of mowing to the time of year, the amount of rainfall, and how high the grass has grown. **The general recommendation is to mow so that no more than 1/3 of the blade height is removed with each mowing.** If you mow lawn to a height of 3 inches, it should be cut again after it reaches a height of 4 inches.
- **Leave grass cuttings on the lawn.** Grass cuttings quickly decompose and are a good source of fertilizer returning nutrients to the soil including organic nitrogen. Clippings left on chemically treated lawns may take longer to decompose.
- **Alternate the pattern of cutting the grass with each mowing** to prevent wear patterns, scalping, and grain (the grass laying over in the same direction). Dense, healthy grass should eliminate most weeds and the need for herbicides.
- **Follow the lawn mower manufacturer's recommendations for service and adjustments.** Dull blades do not cut properly and stress and weaken the grass, making it susceptible to pests.
- **Landscape around your home and throughout the yard.** Strategically planted vegetation will promote water infiltration into the soil. Plants soften the impact of rain and their roots take up water. Leaf debris, mulch, grass clippings, and other decaying organic matter recycle nutrients, build up the organic content of the soil, and improve the capacity of the soil to retain moisture.

- **Preserve existing native vegetation.** An established natural plant community is self-maintaining, efficient, functional and provides benefits including shade, moderation of temperature extremes, storm and erosion protection, and visual screening. Existing native vegetation can be easily complemented with additional vegetation.
- **Consider native plants when designing a landscape.** Native species withstand common disease, the local weather conditions, and eliminate the need for extensive watering and the use of chemicals.
- **Remove invasive exotic plants.** These nuisance plants overtake habitat, and prevent the natural recovery of disturbed land and ecosystems.
- **Recycle unused horticultural waste (grass clippings, leaves, and tree and shrub trimmings) on designated yard waste collection days.**
- **If a professional lawn care service is used as an alternative to home maintenance, find a reputable company that will customize its service to meet your lawn and landscape needs.** The service should use fertilizers and pesticides only as needed, and not on a mass-production basis with a fixed number of treatments to deal with problems that might occur.

WATERING AND IRRIGATION

Landscapes can demand as much as 50% of the water a home uses. Wise water use helps to ensure water conservation, avert emergency water conditions, and allows homeowners to continue to water lawns and plants as needed.

Practice water conservation through creative landscaping:

- **Arrange plants in groups according to their cultural and water needs.** Plants frequently die when a habitat is too different from their natural habitat.
- **Plant vegetation in zones according to similar watering needs:**

1) a very low water zone: native and drought-tolerant plants thrive here with no irrigation. Watering is needed for a limited time to establish new plantings.

2) a low water zone: plants here may occasionally require irrigation. Watering is needed only during extended drought. Plants in this zone can survive for a long time without rainfall. A mulched/planted border around a house is an example of a low water zone.

3) a moderate water zone: this zone is functional, limited in size, and easily maintained because it is separate from other plants. Lawn is one of the main parts of this zone.

4) a frequent irrigation zone: group plants that need frequent watering such as vegetable gardens, flower beds, and fruit trees in smaller areas.

5) special conditions: Areas with sandy soils, terrain where water drains off rapidly, and areas of the yard that are too far to reach with irrigation devices should incorporate drought tolerant plants. Conversely, in areas with poor drainage or low wet areas, plant trees, shrubs, and ground cover that thrive in wet soils.

- **Irrigation should be done in late evening, at night, or very early in the morning when winds and temperatures are low.** Irrigation throughout the day is lost to evaporation. Winds are more likely to blow the water so that it is poorly distributed and does not soak into the ground.
- **Never water during days or weeks of heavy rain. Turn automatic systems off.**
- **Direct water sprinklers away from paved areas. Don't water streets, sidewalks, and drainage ditches.**

Limit the amount
of lawn

A large lawn requires frequent mowing which takes up time or incurs the cost of a lawn care service. Trees, shrubs, ground cover, and other native vegetation absorb many times more rainfall and require less maintenance than a mowed lawn.

- **Use efficient irrigation devices according to water zones and in areas which need more water.** Sprinklers and pop-up spray heads which cover larger areas are best for lawns. Soaker hoses can be used in narrow areas such as borders and areas of ground cover. Low volume drips are suitable for areas where annuals are planted. Microjets and bubblers can be used to water individual trees and shrubs.

Water is kept at the base of the plant so the root zone is irrigated. Bubblers are also useful in smaller areas around patios and pools. **Check to make sure that the proper nozzle is being used, sprinkler heads are clear to ensure even distribution, hoses aren't clogged or leaking, devices are putting out the proper amount of water and covering each zone as required.**

Water only as needed

Don't water on a fixed schedule. Heavier spring and summer rains revive and turn lawns green overnight, so watering your lawn may not be necessary, especially if you leave your grass a little longer; 3 inches is about the best height for the least watering.

- **Explore using super-absorbent water polymers for landscaping and gardening needs.** Polymers form a transparent gel, capture gravitational water from rain or irrigation, and absorb many times their own weight in water which is released to plants as the soil dries out. Polymers promote healthy root systems and soil aeration, and they reduce transplant shock, leaching of nutrients, hard caking of the soil, evaporative water loss, and the rate of consumption.
- **Avoid overwatering the lawn.** Overwatering can lead to dollar weed and nut grass invasion. Soak the grass and soil in the root zone, not just the top of the blades. Frequent light sprinklings can cause shallow rooting and open the yard to disease pathogens. Watch for signs of wilting and water the yard when the edges of grass are curling, the grass fades to a dull blue-gray, or when footprints leave an imprint on the lawn.
- **Water lawns by applying 3/4 to 1 inch of water per irrigation.** This will moisten the soil to a depth of 4 to 6 inches. To determine how long it takes your sprinkler to deliver one inch of water, place several cans at spaced intervals in the spray pattern and run the system until the water level in the cans averages one inch.

To water efficiently and for a more exact calibration, follow these steps:

- 1) For hose-end sprinklers, set 5 to 10 cans (3 to 6 inches in diameter) out at equally spaced intervals in a line from the sprinkler to the far edge of the water pattern. For in-the-ground systems, place the cans at random within one zone and repeat for each zone.
- 2) Turn on the water for 15 minutes.
- 3) Measure the depth of water in each container to the nearest eighth-of-an-inch.
- 4) Calculate the average depth of water by adding up the sum of all the depths and dividing by the total number of cans.
- 5) Multiply the average depth of water by 4 to determine the irrigation rate in inches per hour. This is the amount of water soaking into the soil in one hour. Use the table as a reference for how long your sprinklers should run. If your system operates at a rate of 1 inch per hour and you want to apply 3/4 of an inch of water, you would have to turn it on for about 45 minutes.

Irrigation Rate (inches per hour)				
<i>Amount of water to be applied</i>	1/2"	1"	1 1/2"	2"
	<i>Time in minutes to run each zone</i>			
1/4"	30	15	10	8
1/2"	60	30	20	15
3/4"	90	45	30	23
1"	120	60	40	30

- **Observe water use restrictions which are administered through local and county government agencies.**

EROSION AND SEDIMENTS

Homeowners can encourage rainwater to filter down through the soil rather than flow over it and prevent soil erosion by addressing the following:

- **Be sure that land adjacent to your home slopes away from the building to prevent water from seeping through the foundation.**
- **Plant hardy vegetation, a dense ground cover, or place a layer of gravel or stones in problem areas around your home where roof eaves drain and rainspouts empty.** Turn drainage away from your home by adding downspout attachments such as Dutch drains and trenches which can be installed at the base of a rainspout to divert and carry water into the soil for gradual infiltration.
- **Plant ground covers where soil is exposed and re-sod bare patches in the yard.**
- **Mulch the exposed soil** of foot paths and other heavily trafficked areas, gardens, flower beds, and shaded areas beneath trees with organic leavings such as straw, grass clippings, and partially decayed leaves and twigs, wood chips, and pine needles.
- **Landscaping, construction, and earth-moving activities may expose soil or small mounds of dirt to wind and rain.** Cover these with a tarp or sheet of black plastic to prevent sediments from blowing away or washing into nearby waterbodies or out into the street. Contain larger piles of dirt with bales of hay, screening, or a filter cloth fence.

PERMEABLE PAVEMENTS

Limiting the amount of paved surfaces and other impermeable materials around the home can substantially reduce surface runoff.

- **Consider alternatives to typical slab concrete when planning or replacing a driveway or sidewalk.** Pre-cast concrete lattice helps stabilize soil, makes it easier to permeate and helps to control erosion. It can be installed on a bed of sand, gravel, or shells and allows rain to soak slowly downward.
- **Consider using interlocking pavers for any number of paving needs.** Interlocking paving stones are made of formed, compressed, durable concrete and can also rest on a bed of sand. Advantages include strength, flexibility (enables the pavers to adjust to uneven settlement), and the elimination of runoff problems as water drains between the stones and down through the sand since no mortar or binder is used.

Paving stones have great versatility, aesthetic appeal, and a wide variety of decorative shapes, colors, and patterns for patios, walkways, pool decks, and driveways. For more information, refer to “paving” in the your local telephone directory.

- **Other alternatives to impervious concrete include:** porous asphalt, bricks, tiles, flat stones (flagstone, bluestone, and granite), crushed shells or pebbles, bark chips and untreated wooden decks.

CONTOURING, TERRACING AND INFILTRATION DEVICES

Consider contouring, terracing, and infiltration devices in areas where stormwater runoff is a problem. Rainwater that is captured, spread, and allowed to infiltrate the soil slowly loses its erosive force. It is important to watch where you direct the runoff so it does not become a neighbor's problem.

- **Use a swale and berm system to slow down runoff or to move excess water from one area to another less-used area that allows seepage into the ground.** Swales are low depressions that collect water. Berms are ridges bordering the swales which direct water into and through them.
- **Where natural contours exist or may be created, channel rainwater across the slope instead of down, allowing the soil to absorb more water and decreasing sensitivity to drought.**
- **Install a gravel-lined detention basin to hold runoff and filters it through the soil over a longer time.** Be aware of limiting conditions which can lead to saturation, poor drainage, and standing surface water including compacted soil, clay hardpan, a short depth (1 to 2 feet) to bedrock or a seasonally high water table, and a great volume of runoff from a large land area.
- **Use a series of terraces or runoff spreaders to promote gradual absorption over a wider area by distributing runoff in a fan pattern across a vegetated terrain.**
- **A subsurface drainage system may be the answer to extreme drainage problems that you can't correct by using a swale and berm system or contouring.**

GARDENING

Basics to follow for successful gardening include:

- **Analyze the soil to determine the soil pH, organic content, and the texture which affects water absorption and drainage.** The pH of a soil influences the availability of nutrients to plants and the activity of soil microorganisms.
- **Develop a garden plan and decide what kind of plants you can grow that fit in with the different seasons.**
- **Prepare the soil adequately by adding topsoil, a soil mix, and organic materials.** Soil can be improved by applying mulch, compost, grass cuttings, and leaves. Organic matter improves the structure, texture, and water-holding capacity of the soil. Organic materials enrich the soil by adding nutrients and make the soil more productive. Mix organics into the soil at least a month before planting. Apply well-composted materials when planting.
- **Mulch is useful for gardening and other landscaping needs.** Mulch, a layer of organic material applied to the soil surface, protects plant roots from extremes of heat, cold, and drought. Mulch retains soil moisture, discourages the growth of weeds, slows erosion, and helps prevent soil compaction. Mulching materials include composted kitchen scraps, such as vegetable trimmings and moldy fruit; garden clippings, such as grass cuttings and wood chips, and a layer of newspaper (minus the glossy inserts).
- **Nematodes, those microscopic worms which feed on the roots of plants, causing stunted growth and reduced vegetable yields, can be controlled by raising the organic content of the soil.** Organic matter encourages a healthy population of beneficial insects, worms, bacteria and fungi which discourage nematodes.

Selecting a garden site

Pick a site that receives at least 6 hours of direct sunlight on a daily basis, located close to a source of water for irrigation purposes, with good natural drainage. Conserve water by using organic matter, such as mulch, and irrigation techniques, such as soaker hoses and drip irrigation.

If your garden has a severe nematode problem, you can reduce pest populations through soil fumigation by a licensed professional or through soil solarization. Solarization is a process in which the garden lot is prepared, raked over, and covered with a clear plastic sheet for one month or more. Heat from the sun penetrates the earth and destroys the nematodes.

FERTILIZERS

Serious water problems result from applying synthetic fertilizers to lawns, gardens, and agricultural fields.

Plants can only utilize a certain percentage of what you apply, and the excess fertilizer washes away with the rain into neighborhood waterbodies. Fertilizers contain nitrogen and phosphorus which end up feeding our streams and bays in addition to our lawns and gardens. These nutrients suffocate creeks, ponds, streams and rivers, and kill the fish that live in them. All told, the balance of nature is thrown off — with disasterous consequences!

The excess fertilizer that's not washed away percolates down into the groundwater. Nitrate concentrations can build up, contaminate drinking wells, and seriously threaten human health.

Other problems related to intensely applying fertilizer include the depletion of the soil's growing capacity, the accumulation of inorganic chemical residues in the soil, a decline in humus (the organic part of the soil made up of partially decomposed plant and animal material) and soil deterioration leading to "hardpan." Overfertilization also harms beneficial soil microorganisms and increases your garden's susceptibility to disease.

Use the minimal
amount of
fertilizer required

*Overfertilization can
damage roots, cause
excessive top growth,
burn lawns, and lead to
water pollution prob-*

Fertilize wisely:

- **Feed the soil, not the plant.** Concentrate on building your garden's soil.
- **Consider home composting.** Compost is organic fertilizer made by mixing organic materials, such as kitchen scraps (no meats, bones, dairy products, or fats) and non-woody yard wastes with topsoil, manure, fish scraps, and biodegradable paper. Composting can be as simple as building a heap of at least 3 x 3 x 3 feet in a corner of the yard, or as complex as a series of turning units or a barrel composter which tumbles the waste for aeration.

Benefits are a continual source of organic materials for mulch on soil surfaces or for soil amendments incorporated into the soil and recycling as a sound alternative to needless landfill disposal.

To speed up composting, cut or shred wastes and achieve a good carbon to nitrogen ratio by mixing wastes high in carbon (paper, straw, leaves, wood chips, saw dust) with wastes high in nitrogen (food scraps, grass cuttings, manure), provide adequate moisture (damp sponge consistency), and adequate aeration (sufficient air passages) throughout the pile. Turning on a weekly basis can prevent the pile from being smothered so that bad odors don't develop.

- **Know what your soil requires before applying any fertilizer.** Don't fertilize if it isn't necessary. Monitor soil fertility by testing soil on a regular basis.
- **Select a fertilizer that has little or no phosphorus and approximately 60% of the nitrogen in slow-release, water-insoluble form.** Read labels carefully. Be wary of words such as "natural" and "organic." Some organic fertilizers contain too much phosphorus for safe water.
- **Fertilize during dry seasons.**
- **Avoid applying fertilizer on windy days, prior to a forecast of heavy rains, or near paved surfaces.** If you spill fertilizer on walks, patios, or driveways, sweep it up so it doesn't wash off in the next rain. **Never apply fertilizer within 50 feet of a waterbody.**
- **Use fertilizer appropriately according to package instructions.** Never use a fertilizer formulated specifically for gardens on the lawn or vice versa. Generally fertilizer should be applied when the soil is moist. Watering lightly will help it sink into the root zone where plants can use it. Fertilizer that remains at the surface may be lost to rain or wind.

PESTICIDES

Home gardeners use more pesticides per square foot in their gardens than farmers do in their fields!

Pesticides quietly pollute streams, lakes, and other bodies of water. Chlorinated hydrocarbons and many other pesticides and herbicides are produced to resist breaking down under normal conditions. After application they leach from the soil or are carried off the surface by rain or snow.

Insecticides used to control specific pest populations may end up killing predatory spiders, insects, and other beneficial organisms which could have controlled the pest population naturally.

Other problems resulting from widespread pesticide use include the development of resistance to pesticides and resurgence by a population; secondary pest outbreaks in which a non-target organism becomes a pest; and accidental poisoning when the pesticide is swallowed, inhaled, or absorbed through the skin.

Reduce pesticide use:

- **Buy disease and pest-resistant varieties of plants.**
- **Time planting to insect life cycles.** You may be able to completely avoid an insect pest and peak infestations. Keep records of dates when problems occur for future reference.
- **Use intercropping or planting alternate rows of complementary plants.** Planting herbs between vegetables will attract certain beneficial insects that prey on pests. Examples are herbs belonging to the mint family and some members of the carrot family.
- **Use mixed or companion planting to discourage insect pests.** Some herbs and flowers can be used as borders to effectively repel insect pests.
- **Use rotation.** Shifting the growing locations of vegetables inhibits the stabilization of pest populations. Giving the land a rest helps reduce fertilizer and pesticide use. Divide the garden into sections and leave one part empty.
- **Include perennial beds and mulched paths in your garden as habitat for pest-eating insects and animals.** Allow annuals and perennials to go to seed before pruning them to provide additional food and cover.

Avoid monoculture gardening

By spot planting or growing a certain type of plant in several sections of the garden, you can avoid total destruction if pests do move into one part of the garden.

- **Plant trees, shrubs, and groundcover of varying heights to accommodate birds, lizards, toads, and other wildlife.** Diversity is a part of a healthy garden. A balanced garden includes natural enemies as a check on pests and the overexpansion of all species.
- **Encourage the presence of beneficial insects by growing insect-attracting plants that provide both nectar and larval food.**

- ∨ Dragonflies catch flying insects, especially mosquitoes.
- ∨ Ladybug and flower fly larvae dine on aphids.
- ∨ Green lacewings control aphids and white flies.
- ∨ Spiders are voracious predators.
- ∨ Caterpillars are parasitized by some species of wasps.

Have patience! there may be some lag time between the appearance of a pest population and the point when natural enemies move in.

Any measures you take prior to the arrival should not kill the natural predators, too.

- **Use physical barriers and mechanical means to prevent and control pests. Cover seedlings with a fine mesh cloth for protection or wrap aluminum foil around the plant base.** Insects, such as mites and aphids, can be knocked off with a burst of water from the garden hose.

You can make homemade traps by collecting leaves of the plant to which the target insect is attracted. Then destroy the pests.

For a slug problem, place flat wooden boards can be placed on the ground next to plants. Wait for slugs to collect, then overturn the boards to expose the slugs and other bugs.

- **Care for your garden.** Keeping it properly watered and fertilized will make it less susceptible to disease and pests. Keep the garden and yard free of insect-attracting debris such as fallen fruits and vegetables, old sacks, baskets, and other rubbish. Remove pots, watering cans, and any other containers which hold water; they are sources of mosquitoes.
- **Inspect the garden at least twice a week for insect damage.** Examining seedlings and plants early each morning for potential problems can help prevent a major infestation. Remove egg clusters, larvae, and adult pests by hand.
- **Use low-toxicity pest controls.** Natural insecticides derived from plants can be used. Pyrethrum, which is derived from the Chrysanthemum, should only be sprayed directly on the pest as it is non-discriminatory and will kill beneficial insects as well as harmful species.

Quassia, derived from the bark of the *Picrasma quassidoes* tree, is effective against soft-bodied aphids and caterpillars, sawfly, and leaf miners. It is one of the safest botanical insecticides and doesn't harm bees, ladybugs, and other "good" insects.

- **Other “safe” pesticides include mild soap solution using Ivory liquid or an equivalent.** Insecticidal soap has a potassium salt base and destroys pest membranes. To work effectively, you must apply the soap directly on the insects which include aphids, mealy bugs, scale, white flies and red spider mites.

You can also try homemade plant sprays such as:

- ✓ table salt spray (2 teaspoons to 1 gallon water),
- ✓ tomato leaf spray (made by steeping tomato leaves in water), and
- ✓ other recipes using a variety of ingredients such as onion, garlic, hot peppers, and pungent herbs.

Effectiveness will vary. Consult an organic gardening reference for more information.

- **Use biological controls *WITH CAUTION*.** *Bacillus thuringiensis* (BT) kills leaf-eating caterpillars by paralyzing the digestive tract, but is not appropriate where butterflies are attracted. Synthesized hormones can alter the growth, development, and reproduction of good and bad insects.
- **Use chemical pesticides only as a last resort.** Pesticides labeled CAUTION are less toxic than those labeled WARNING which are less toxic than those labeled DANGER. Safer insecticidal soap and dormant oil sprays are less toxic than conventional synthetic pesticides. Choose synthetic pyrethroids over organophosphate- or carbamate-based products. Pyrethroids remain in the environment for a shorter time.
- **Treat all pesticides as potential poisons.** Read labels carefully. Apply strictly according to the manufacturer’s recommendations and follow safety precautions. *Refer to the At Home chapter and the Household Hazardous Waste Chart for information on storing and disposing of pesticides.*
- **Apply pesticides in late afternoon or early evening** to avoid killing bees and other pollinators. Stop applications during harvest season.
- **Never apply pesticides near wells, streams, canals, marshes, or other bodies of water unless the instructions specifically allow for such use.**
- **Never apply pesticides on a windy day.**
- **Never apply pesticides to bare ground or eroded areas.** Many pesticides bind to the soil and could be washed into storm drains and streams along with sediments during a heavy rain.
- **Never hose down leaks or small spills.** Clean up the area by covering the spill with an absorbent material such as sand, sawdust, or kitty litter, and sweep it into a sturdy bag. Double bag it and take it to a hazardous waste collection center. Wash down the area (if a hard-surfaced floor or driveway) with a solution of water and bleach or a strong detergent.

WATERFRONT PROPERTY OWNERS

Preserving the Natural Shoreline

Special responsibilities come along with the pleasure of living on the water.

Waterfront property owners who live along a bayfront, creek, canal or stream have unique access to these waterbodies and the opportunity to protect and monitor them. *Keep in mind that a healthy coast means a healthy economy and a healthy nation.*

When people and industries build on, dredge or fill estuaries, wetlands, and submerged lands, we destroy the coast. In addition to being beautiful places for us to live, these habitats are essential to the food web and critical to our nation's seafood. In the end, by altering the coast, we hurt ourselves.

SHORELINE EROSION

Protecting the coast does not necessarily mean keeping the shoreline in place. The coast naturally shifts, moving sand and sediment from one place to another, frequently in the form of erosion. Certain places on the coast build up over time; other spots erode.

Shoreline armoring, such as using seawalls, bulkheads, jetties, and revetments, interfere with this natural shifting and may even contribute to erosion. These devices can trap sand in one place — sand that's needed downstream, which "starves" these beaches. *By using these devices, you may be harming property further down the coast!*

NATURAL PROTECTION

Barrier beaches, dunes, dune grasses and other native vegetation, absorb the impact of waves crashing against the shore and help prevent erosion.

These natural protectors also provide shade along waterways and regulate the water temperature. Cooler waters hold more oxygen, which is critical to the survival of fish and other aquatic animals. Removing natural protectors or trimming native plants too low can result in rising water temperatures, decreasing the oxygen and killing the plants and fish.

Native shoreline vegetation also acts as a pollution filter, absorbing the nutrients, such as lawn or garden fertilizer, carried to the coast with rain water. By absorbing the nutrients, the native plants prevent these pollutants from overfertilizing and harming the coast.

What Waterfront Property Owners Can Do To Protect The Coast

- **Protect the natural slope and native shoreline vegetation.** Modifying the shoreline structure by changing the natural contour and removing or cutting vegetation, can eliminate benefits including breeding grounds and nursery habitats for estuarine fish, invertebrates, and wading birds, water quality maintenance, shoreline stabilization, and reduction of inland flooding.
- **Revegetate areas with native plants.** Take into consideration: the existing vegetation (also find out what the original vegetation was before removal or alteration), water depth and water level fluctuations, tidal activity, water salinity, shoreline slope, drainage characteristics and any other site specific factors. Refer to an environmental consulting business or landscaping firm that specializes in shoreline vegetation.
- **Plant shoreline vegetation along a gentle slope from higher ground seaward.** Plants will not be able to filter pollutants efficiently or prevent pollutants from entering the waterway if they are planted after a steep slope or a sudden drop in water depth.
- **If planting on a steep bank or eroded area, use biodegradable paper or sisal nets or a tarpaulin to prevent erosion and to help stabilize the bank until the vegetation covers the area and holds the soil.**
- **Regrade the shoreline landward of mean high water with a gradual slope (between six to three feet horizontal to one foot vertical).** Coastal permits or variances may be needed.
- **Place a swale and berm system in areas where stormwater runoff is a major problem.** Swales should have gradually sloping sides with three or more feet horizontally to one foot vertically. Swales catch the rapid flow which is held by the berm so that nutrients and pollutants can settle to the bottom and percolate slowly through the soil.
- **If the property has a natural contour which forces stormwater runoff to drain into one or two locations, create a percolation basin or pond to retain stormwater runoff.**
- **Terracing can be used to help control erosion and stormwater runoff problems on waterfront property that has a very steep backyard.** Terracing creates a series of tiers with the last tier meeting the water's edge and could incorporate a swale and berm system, a ground covering that would not require mowing or fertilizer, and native shoreline vegetation.

Key Concept

The two most important things that waterfront property owners can do are:

1) maintain the native vegetation and

2) maintain the natural slope of the shoreline.

Restoring the vegetation and improving the shoreline may be possible in some cases.

- **If a hardened shoreline such as a seawall is in place, consider planting native vegetation seaward of the structure, if the soil is at mean high tide or higher.** Consider placing a swale and berm system a foot or two back from the seawall to prevent stormwater runoff from cascading over the wall and into the waterbody.
- **Before hardening a shoreline, consider the building and maintenance expenses as well as environmental concerns.** Consider alternatives which are ecologically sound. Sloped riprap or rock revetment is preferable to a seawall. Vertical seawalls are more vulnerable to erosion, wave, and storm damage.
- **Remove exotics and replace them with native vegetation.** Problem species spread aggressively and become established along coastal zones, canals, waterways, and drainage ditches. They shade out, exclude, or outcompete desirable native species which stabilize the shoreline and are part of the food web.
- **Keep the adjacent waterway free of organic yard debris such as grass clippings, shrubbery trimmings and leaves.** These items also contribute to water pollution. Lodged in a creek bend or trapped and rotting at the end of a canal, dissolved oxygen is used up in the process of decomposition, depriving fish and aquatic plants of needed oxygen.
- **Dock planning: Design the dock access ramp and the main platform in accordance with state regulations.** Use the smallest possible area and a plan which is environmentally sensitive.
- **Important:** *The toddler or young child who wanders off is far less likely to drown in the shallows along a natural shoreline. Vegetation gives children something secure to grasp hold of and pull themselves up by. A vertical seawall is a steep drop and a child would never be able to climb the slick concrete slab which has nothing to hold on to.*
- **Monitor the creek, canal, or waterbody adjacent to your property.** Walking, canoeing, or boating the stream behind your home on a regular basis can alert you to any number of problems.

Use native plants
to landscape
the backyard

Plants should also be suited to site specific drainage features. Planting non-nativespecies can cause you to need more fertilizers and pesticides which pollute the water and stress the ecosystem.

Look for erosion, stormwater runoff, and turbidity problems generated by road and bridge construction. Are turbidity screens in place and functioning properly or are the waters near the work site disturbed and muddy?

Get to know the stream and keep an eye out for algal blooms, fish kills, and discharge of sewage. Debris in waterways can interfere with the natural flow and block fish migration.

Be aware of certain areas along the stream where dumping has occurred. Trash, derelict vessels, and white goods such as old washing machines and refrigerators should be removed. Mark the location of potential problems on a map and notify your coastal program.

RECREATION

The coast offers a bountiful, seemingly infinite number of wonderful recreational opportunities. Although these activities provide relaxation and bring pleasure, they can harm the coast if we're aren't careful.

BOATING

Boating directly impacts the health of our waterways. By understanding the potential negative impacts of boating activities and observing precautions associated with boating, boat owners can help ensure the health of the coast and help preserve it for future generations.

Boat wakes can increase shoreline erosion. Erosion is a particular problem in narrow creeks, canals, the intercoastal waterway, and inlets where wakes wash heavily against the banks.

The extent of shoreline erosion caused by a boat's wake depends on the energy of the wave, which in turn, is related to the hull size, boat speed, the distance from shore, and the depth of the water the boat is operating in.

The other major problem associated with boats has to do with the release of chemical pollutants into area waters.

Fuel, cleaning agents, and chemicals used in boat maintenance are toxic and contribute to the degradation of bay waters.

Cleaners contain acids, alkalies, and petroleum distillates. Paints, paint removers, lacquer thinners, and solvents contain substances such as chlorinated hydrocarbons, ketones, toluene, and xylene, which are not only toxic to aquatic life, but present health risks to humans as well.

Fuels and chemicals used in the operation, cleaning, and maintenance of a boat should be used with extreme care.

Key Concept

You can greatly reduce the impact of your boat's wake on shoreline erosion if you slow down before, rather than at, the speed limit marker.

Keep out of seagrass meadows; protect and preserve this habitat which is critical to our economy.

Boat Operation

- **Observe posted wake speeds and NO WAKE signs.** There may be some narrow areas that should be navigated through at low idle.
- **Operate your boat in appropriate water depths.** Leave adequate clearance (at least 12 inches) between the boat propeller and the submerged bottom. Avoid shallow areas to keep from churning up the bottom. The turbulence caused by a propeller will exceed beyond the depth of the motor's lower unit, causing damage to benthic communities.
- **Avoid cutting through seagrass beds.** Become familiar with areas where seagrass beds are abundant. If you inadvertently enter a seagrass area, follow these steps: cut your engine and back out of the vegetation with a pole or an oar. Seagrass beds are vital to the health of the estuary. They suffer extreme damage from propeller scarring and take years to recover.
- **When fueling the boat, avoid spilling fuel or overfilling the gas tanks.** Learn to estimate fuel consumption relative to your boat's tank capacity. Tighten the cap and clean up any spilled fuel. Fuel overflow is dangerous to people as well as aquatic life.
- **Discharge bilge water offshore in deeper waters when possible.** Fuel, oils, and chemicals that are spilled in a boat are discharged with the bilge water. It is important to keep your boat clean and free of spills.

Boat Maintenance

- **Avoid products that remove stains and make your boat shine.** These are toxic to fish and aquatic life. Avoid products with WARNINGS on the labels; they can kill marine life if washed overboard.
- **Maintain your boat engine to avoid any oil leaks.** Many area marinas recycle motor oil. If you change the oil in your boat, bring used oil to a marina which provides a used oil drum for recycling or a hazardous waste center. Never dump oil into a waterbody, a storm drain, or roadside ditch.
- **Many of the cleaning, dissolving, and painting agents used for maintenance are toxic to humans and aquatic life.** When working on your boat, be conscious of the materials used and the toxicity of each. Take care in following the manufacturer's directions. Take hazardous wastes and their containers to a recycling center when you're finished.

Rinse and scrub
your boat with
a brush and water

*When you must use soap,
choose one that is bio-
degradable and
phosphate-free.*

*Cleaning your boat on a
regular basis will
decrease the need for
stronger, more hazardous
cleaning and dissolving
agents.*

- **When scraping or sanding the bottom of a boat, place a drop cloth underneath for safe disposal of the scrapings.** Anti-fouling boat paints, which contain copper or tin and which inhibit the growth of barnacles, are extremely toxic. Use of tributyltin (TBT) bottom paint is now restricted by federal legislation.
- **Thoroughly clean the boat’s hull, propeller, and trailer after using the boat in other waters.** Never discharge bilge or ballast waters from foreign waters into harbors or marinas. Boats have been responsible for the accidental introduction of nonnative aquatic plants and animals into U.S. waters, causing stress and damage to native species and changing the ecosystem.

AIR BOATS AND JET SKIS

Operating and maintaining air boats and jet skis have the same potential negative impacts associated with boating. Because of their special features or compact size, air boats and jet skis have access to areas that naturally restrict most boats. Some of these areas are environmentally sensitive.

As an air boat skims over the water’s surface, the weight of the boat pushes down, producing a pressure wake. In shallow waters air boats leave a trail, pressing down vegetation, disturbing bottom sediments, and damaging benthic dwellers.

Jet skis run on an impeller system which has the potential to create turbidity in shallow waters, and they use a gas/oil fuel mixture. Vendors should inform tourists and the general public who rent jet skis of the potential negative impacts and request cooperation.

Air boat and jet ski owners and operators should observe the following boating precautions where applicable:

- **Observe posted wake speeds and NO WAKE signs.**
- **Avoid cutting through seagrass beds.**
- **Avoid spilling fuel and clean up spills immediately.**
- **Clean the air boat or jet ski with a brush, sponge, water and a biodegradable, phosphate-free soap.**

Avoid environmentally sensitive areas

These areas include shallow, estuary waters where the propulsion and turbidity could disturb or damage aquatic plants, invertebrates, and the living community on the water's floor.

These tiny creatures are the beginning of the food web and if we destroy them, we will damage the rest of the web, including ourselves.

MARINE DUMPING AND DEBRIS

Marine debris will not disintegrate, has the potential to harm aquatic life and to damage boat engines by clogging intake valves and ports and becoming tangled around propellers.

- ∨ Plastic bags are mistakenly ingested by sea turtles as jelly fish, a common food item.
- ∨ Monofilament fishing lines and six-pack plastic rings can entrap pelicans and other seabirds, and ultimately strangle or starve the birds.
- ∨ Whales, dolphins, and other marine mammals are at risk through ingestion or entanglement of plastic refuse.

Trash storage and disposal will not become a problem if boaters:

- **Designate an area where trash can be stored on board the boat.**
- **Secure any loose items so they do not blow overboard or fly out of the boat when it is in operation.**
- **Never throw anything (cans, plastic objects, miscellaneous items, leftover food, etc.) overboard.**
- **Use marina pump-out stations.** Empty your boat's marine sanitation devices and/or holding tanks at pump-out stations, not overboard. The U.S. Coast Guard requires sanitizing gear or an onboard holding tank within three miles of shore.

SEWAGE DISPOSAL

*Dumping untreated sewage into coastal waters may contaminate shellfish, which if eaten by humans, can cause severe gastrointestinal illness or infectious hepatitis. Human wastes also contain the nutrients which contribute to algal blooms and oxygen depletion. **Protect coastal waters by minimizing or eliminating the discharge of boat sewage.***

- **Use on-shore sanitary facilities whenever possible.**
- **Chlorine and other disinfectants are used in marine sanitation devices.** Chlorine degrades water quality and negatively impacts aquatic life. Discharge should occur only when necessary and in offshore waters deeper than 20 feet, where tidal movement will disperse treated waste.

ALL-TERRAIN VEHICLES

All-terrain vehicles, if driven recklessly and indiscriminately, can damage the environment. All-terrain vehicles can traverse any number of habitats including fresh and saltwater marshes, pine flatwoods, scrub, and cypress swamp.

Over a period of time they kill vegetation, leaving the area bare and subject to erosion. The set of tracks also becomes an unwanted road. Tearing up land can alter the normal sheet flow and drainage patterns. All-terrain vehicles can be very disruptive to wildlife and particularly destructive to those creatures which are buried in the mud at the sediment-water interface or the top layers of the soil.

All-terrain vehicle operators can help protect water quality and native plant and animal communities as follows:

- **Avoid environmentally sensitive areas including marshes, cypress swamps, scrub, and erosion-prone areas.**
- **Operate all-terrain vehicles at moto-cross parks, cross-country courses, and other areas specifically designated and reserved for the use of all-terrain vehicles.**

FISHING

- **Know the procedures for the safe removal of hooks and monofilament line and the procedures for rescuing injured birds. Don't use barbed hooks.**
- **"Catch, photograph and release"** is one way to ensure that fish stocks stay healthy.
- **Follow your state's fish-catch guidelines on size and number.** These guidelines protect the fish species and maintain the fish and the habitat's health.
- **Don't capture fish or crabs while they are mating.** Be wary of catching fish or crabs in pairs, especially during standard mating seasons.

KEEP PUBLIC RECREATIONAL AREAS CLEAN

Trash is the most visible kind of pollution we encounter at the beach, in our parks, forests, wildlife sanctuaries, and on roadsides. It is easily removed and even more easily prevented.

- **Carry a bag to secure and remove any trash at the end of an outing.** Trash collection should involve all family members. Allow children to participate to instill responsibility.
- **Use public restroom facilities.** Do not allow children or pets to urinate in the water or defecate on the beach.
- **Encourage your municipality or county to provide clean, adequate restroom facilities and to maintain them.** These public areas should also have an adequate number of garbage cans which are readily accessible.
- **Participate in beach clean ups.** Beach clean ups can be a treasure hunt and turn up a surprising amount of trash and some fascinating items. You'll enjoy the community spirit and the satisfaction of a job well done at the end of the day.

COMMUNITY EVENTS, CELEBRATIONS, FESTIVALS AND FAIRS

Large public events which draw many throngs of people create potential litter problems unless trash disposal facilities are easily accessible and arrangements for collection and removal are well-orchestrated.

Balloons, which can be fatal to wildlife, are often sold or given away at fairs, festivals, and grand openings. Because of their spectacular display, balloon releases were often used to kick off campaigns and special programs.

Balloons, commonly made from latex or Mylar plastic, can easily become another form of plastic litter and are capable of killing or debilitating sea turtles, seabirds, migratory waterfowl, and marine mammals.

Balloon event substitutes can be just as colorful without harming the environment. Indoor launches with balloons decorating the ceiling, delivering balloons to childrens' hospitals and nursing homes, and hot air balloon rides are just some of the possibilities.

- **Be responsible for food and drink containers, balloons, and other items acquired at fairs and other public events.**
- **Take particular care with balloons and other plastic items. Be aware that even one balloon which drifts away may injure or cause the death of a creature.**

Kites and balloons

Lost kites and balloons may drift offshore. If not recovered, kites, balloons and other plastic items pose a serious hazard to sea turtles, birds, and marine mammals.

Kite and balloon enthusiasts should always be responsible for their toys' recovery.

GOLF

Avid golfers and club members can do an enormous service by taking an active interest in the management of area courses.

- **Encourage the use of Integrated Pest Management (IPM), as an alternative to the complete reliance on pesticides.** IPM monitors pest problems, takes into consideration environmental factors, and uses synthetic pesticides only as needed.
- **Encourage the use of an “all-natural fertilizer mix” containing such ingredients as bone meal, feather meal, wheat germ, soya, muriate of potash, enzymes, and soil microorganisms.**

These kind of natural fertilizers help to reduce the number of applications, may prolong the length of time the course remains green, and work to increase the soil’s ability to hold water.

- **Encourage the use of a no-phosphorus fertilizer or a low-phosphorus formula fertilizer, if phosphorus must be applied.** Example: a 12-4-8 formula indicates 12% nitrogen, 4% phosphorus, and 8% potash by weight.
- **Encourage the use of a fertilizer that releases slowly despite the presence of water.** A high percentage of the nitrogen (at least 60%) should be in the form of Water Insoluble Nitrogen (WIN).

Slow-release fertilizers benefit the golf course and downstream bodies of water. The greens receive a steady input of nitrogen. Slow-release fertilizer that washes into area waters will not be immediately available to the plant life, which helps prevent algal blooms and uncontrolled aquatic weed growth.

Get involved with your golf course

Encourage the minimal use of pesticides, herbicides, insecticides, and fertilizers where older pest control practices are still being used.

Also, encourage your golf course to test periodically for pesticide contamination in golf course waterbodies, adjacent creeks and groundwater.

COMMUNITY

A community can mobilize for water pollution prevention, clean ups, environmental planning, and growth management.

Ordinary citizens do have the power to exert influence, bring about change, and make things happen.

We can make a significant impact by reducing our demand for water and electricity, petroleum products, paper, wood, and metal products and land.

We can also reduce the amount of toxic, non-biodegradable wastes which we produce and discard and in the process create serious water pollution problems that are harmful to all life.

We need to ask ourselves if we really *need* a particular product and weigh the benefits vs. the potentially harmful effects. *Using environmentally friendly products and changing the timing of activities in order to minimize environmental impacts can make a difference.*

Key Concept

One of the most important steps you can take to help create an environmentally wise community is to provide information in a friendly and involving way that encourages people to do more.

Help get the word out and share this book with your family, freinds, neighbors, and co-workers.

Working together to prevent pollution makes far more sense than cleaning up pollution, which can be difficult and expensive!

Actions we can take to become an environmentally wise community:

- **Vote.** Support and elect officials who support environmental protection. Attend community election forums and town meetings where candidates discuss their views and find out how they stand on local, regional, state, national, and global environmental issues. Monitor a candidate's voting record and compile voting charts on officials running for re-election to help inform the general public. Request that first-time candidates, who are without a voting record, complete an environmental survey.
- **Letter writing to elected officials (local, state, and federal) and to environmental, regulatory agencies is one of the simplest and most effective ways to influence public policy.** The best time to call or write is when decisions are being made. Write legislators before a vote on a bill. Write environmental agencies when a regulation has been proposed. Follow the news and read to keep track of what legislation is being considered and when.
- **Garner support by writing a brief and concise letter to a newspaper editor.** Suggest actions that others can take to assist your cause. Elected officials and decision-makers scan the letters-to-the-editor section to follow public opinion on current issues.

Follow a congressman's suggestions for effective letter-writing:

- Address it properly.
- Identify the bill or issue by number or popular name.
- The letter should be timely (mail so the letter arrives while there is still time for officials to take action, i.e., before a vote).
- Focus on your representatives.
- Be brief and concise.
- Ask for a response; don't hesitate to ask questions, and request clarification to an equivocal response.
- Write your own views. A personal letter which incorporates your own experiences and observations is far more effective than a form letter or petition.
- Give your reasons for taking a stand. Your legislators or government officials may not know all the effects of the bill and what it may mean to an important segment of their constituency.
- Show understanding. Indicate an awareness of the proposed bill, regulation, or ordinance and its potential impacts within your community.
- Be constructive and offer alternative solutions.
- Ask for specific actions to be taken such as cosponsoring a bill or supporting an amendment.
- Share expert knowledge with your representatives. Well-researched information is appreciated.
- Use a personal or business letterhead with a complete return address.
- Say "well done" when it is deserved. Remember to thank representatives for their efforts. Expressing disagreement politely may help on a related issue later.
- Some don'ts include:
 - Don't make threats or promises.
 - Don't berate your representatives.
 - Don't pretend to wield vast political influence.
 - Don't write on every single issue.

- **Become knowledgeable and involved with local comprehensive planning.** Obtain a copy of the county comprehensive land use plan, local zoning ordinances, and natural resources inventory. Attendance at planning meetings can help you assess what is happening within the community and public presence can be influential.
- **Attend city council and county commission meetings.** Let officials know that you are concerned as an individual or as a member of an organization (homeowner's association, conservation group, etc.). Become involved and work to influence decisions. Tackle an issue, become informed on the specifics, challenge the experts, wage a publicity campaign, and submit "best management practice" strategies as solutions to water quality problems.
- **Join or form a water association which addresses water use and conservation, water pollution problems, and watershed and wetlands protection.** Take local officials on a tour so they understand the dynamics of the watershed and become familiar with area water resources and pollution problems.
- **Find strength in numbers.** Form alliances with groups and agencies sharing common concerns. A coalition of environmental organizations, civic associations, service organizations, and other community groups has more influence than one single group. Take your group's concerns to other professional, academic, and civic organizations, too.
- **Networking with affiliated groups on a statewide basis can provide valuable information and may yield solutions to similar problems.**
- **Involve civic associations, service organizations, churches, scout troops, and other community groups in water quality and natural resource protection.** Arrange speaker/slide presentations, panel discussions with local officials, and half-day workshops on wetlands, estuaries and water quality issues.
- **Arrange for tours of sewage treatment plants, landfills, large agricultural operations, area creeks and waterbodies, and other areas of special concern to learn first-hand about water quality problems and issues.**

Join an organization

Membership to national, regional, and local coastal or environmental organizations, such as "Friends of" National Marine Sanctuaries, National Estuarine Research Reserves, or many others, also helps preserve the coast.

Even if you don't have time to frequently participate in the organization's events, membership dues are well-used and newsletters keep

Invite local government officials to go along and initiate discussions on improving water quality. Propose constructive measures to solve water pollution problems and protect estuarine resources.

- **Deal with specific issues.** Concentrate on one particular problem in the community. Avoid tackling many different problems and diluting resources and volunteer power.

Local environmental groups should use scientists, physicians, engineers, attorneys, teachers, and technicians from within the community to set environmental priorities and help with community actions.

- **Develop educational water quality projects that high school and elementary students can participate in such as creating and monitoring a wetland habitat or planting vegetation at a restoration site.**

Parents and teachers can encourage water quality projects in annual school science fairs, 4-H fairs, and other area events where environmental displays would be welcome.

- **Inform your state and federal government representatives about important community projects to protect and preserve water resources.**
- **Request local TV and media coverage of water quality projects, community events, and environmental programs to promote greater public awareness.**
- **Join a citizen volunteer monitoring program.** Scientific water quality monitoring involves volunteers collecting and analyzing water samples from designated sites. They can document pollution problems (nitrate levels), identify pollution sources, raise public awareness of water quality issues, and educate the public about preventing and reducing water pollution. Check with your state coastal program or National Estuarine Research Reserve on these programs.
- **Organize a stream clean up and other water quality projects that all members of the community can work on.**

Walk, canoe, or boat local creeks and canals to remove discarded trash and check for specific problems including erosion, algal blooms and fish kills, sewage discharge and stormwater runoff, and highway and construction debris.

Participate in Beach Clean Ups, Adopt-A-Beach and Adopt-A-Road programs, Estuary Day, Coastweeks, and other local environmental activities and events.

APPENDIX

Alternatives to Household Hazards

Products and traditional cleansers that can be substituted as natural alternatives:

Products	Natural Alternatives
Oven Cleaner	Avoid the use of harsh chemicals by wiping away grease and spills after use. For spills, let oven cool slightly, sprinkle salt on the spill, wait a few minutes and wipe area clean with a wet cloth. For scouring the oven, use baking soda (do not let baking soda touch wires or heating elements) and a damp sponge. Scour racks and burner inserts with steel wool.
Drain Cleaner	For clogged drains, try a plunger first. Dissolve 4 ounces baking soda and 8 oz. vinegar in a small amount of boiling water. Pour down drain and wait for fizzing to stop. Flush with tap water.
Toilet Bowl Cleaner	Sprinkle baking soda around the bowl followed by vinegar. Scrub with a toilet brush. Vinegar is a mild acid and should remove hard water scale.
Abrasive Powder Cleansers	Sprinkle any of the following on the surface to be cleaned: baking soda, borax, or dry table salt and scour with a damp sponge. Rinse thoroughly with water to remove grit.
Basin, Tub, and Tile Cleaner	Cut a lemon in half and dip it in borax. Rub surfaces with lemon and rinse.
Ceramic Tile Cleaner	Mix 1/4 cup vinegar in 1 gallon of water. Scrub with a brush.

Products	Natural Alternatives
Mildew Remover	Dissolve 1/2 cup vinegar and 1/2 cup borax in warm water. Apply to tiles and grout with a sponge or brush. Wipe and rinse clean.
Glass, Window, Mirror Cleaners	<p>Wipe away surface dirt with a paper towel or soft cloth.</p> <p><i>Window Cleaner 1:</i> Mix a solution of 2 tablespoons vinegar to 1 quart water. Apply with a wad of newspaper.</p> <p><i>Window Cleaner 2:</i> Mix 3 T ammonia, 1 T vinegar, 3/4 cup water in a spray bottle. Wipe down with a squeegee to prevent streaking. Avoid spilling cleaner on painted or varnished woodwork.</p> <p><i>Window Cleaner 3:</i> Mix 1/2 cup cornstarch in 2 qts. warm water and apply with a sponge. Wipe windows dry with a soft cloth.</p>
Dishwasher Soap	Mix 1 part borax and 1 part washing soda. Depending on how hard the water is, adjust proportions to avoid soap film on dishes.
Furniture Polish	<p><i>Furniture Polish 1:</i> Mix 1 part lemon juice with 2 parts olive or vegetable oil.</p> <p><i>Furniture Polish 2:</i> Mix 2 teaspoons lemon oil and 1 pint mineral oil in a spray bottle.</p> <p><i>Furniture Polish 3:</i> Mix equal portions of denatured alcohol, fresh strained lemon juice, boiled linseed oil, and gum turpentine in a labeled jar. Shake before each use.</p>
Liquid Floor Polish	Melt 1/4 cup paraffin in a double boiler. Stir in 2 qts. mineral oil. Transfer to labeled containers.
Silver Polish	Clean silver items with toothpaste, mild dishwashing liquid, and warm water using an old toothbrush on tarnished areas.

Products	Natural Alternatives
Brass and Copper Cleaners	<p>Combine 1 pint of soap jelly, 1 cup whiting, and 1 teaspoon ammonia into a paste and beat together before soap jelly congeals.</p> <p>Rub the paste on metal articles.</p> <p>Wash them in hot sudsy water, rinse, and dry with a soft towel.</p> <p>To make soap jelly:</p> <ul style="list-style-type: none"> ∨ Dissolve 1 cup of shaved soap or soap flakes in 1 qt. of boiling water. ∨ After soap is entirely melted, pour it into a jar with a wide mouth and place it in a cool place until the mixture jells. ∨ Copper can be cleaned by rubbing a mixture of salt dissolved in hot vinegar. <p>Rinse and wipe with a clean rag.</p>
Aluminum Cleaner	<p>Scour with soap jelly and whiting using fine steel wool.</p> <p>Brighten discolored pans by boiling in a solution of 1 T vinegar and 1 qt. water.</p>
All-Purpose Cleaners	<p><i>General Cleaner/Disinfectant 1:</i> Mix 1 T baking soda, 1/4 cup vinegar, 1/4 cup ammonia and 1 gallon hot water.</p> <p><i>General Cleaner/Disinfectant 2:</i> Dissolve 1/2 cup borax in 1 gallon warm water.</p> <p><i>General Cleaner/Disinfectant 3:</i> Mix 1/2 cup ammonia, 1/2 cup baking soda, and 1 gallon warm water into a bucket. After cleaning, rinse with clean water. Unused cleaner can be stored in a labeled bottle or jar.</p> <p><i>Other general cleaners include:</i> # 1 vinegar, salt, and water, # 2 vinegar in water, # 3 baking soda and water, and # 4 soap pads.</p>

Products	Natural Alternatives
Ant and Roach Sprays	<p><i>Roaches:</i> Mix 16 oz. boric acid, 1 cup flour, 1/4 cup sugar and pieces of finely chopped onion. Add water a little at a time to make a soft dough. Shape into small balls and place these where roaches travel and hide.</p> <p><i>Ants:</i> Mix 1 egg white, 2 T sugar, 1 T boric acid, and 1/2 cup water together until boric acid is dissolved. Spoon into jar lids and set lids in areas where ants appear and travel. Refill the lids when solution dries out. Allow three to four weeks for poison to take effect.</p> <p>Keep out of the reach of children and pets.</p>
Moth balls	Place cedar blocks, lavender sachets and other dried herbs in closets and drawers.

The nontoxic alternatives including baking soda, washing soda, borax, boric acid, and ammonia can be purchased at supermarkets and pharmacies. Linseed oil, turpentine, and whiting can be purchased at hardware and/or paint stores.

APPENDIX

HOUSEHOLD HAZARDOUS WASTE DISPOSAL

The Household Hazardous Waste Chart provides a reference to safe, effective disposal of typical wastes used in and around our homes.

Materials are classified as follows:

- **Materials which can be poured down the drain with plenty of water for dilution.**

If your home has a septic tank system, take additional precautions.

Certain chemical substances cannot be used with septic tanks. Products are now required to carry warnings if damage to septic systems can occur.

Read labels carefully and treat products that have been stored for several years and older, unlabeled products as materials to be taken to a hazardous waste collection center.

Warning: Never pour a succession of different household chemicals down the drain one after another. Do not use strong cleaning agents such as chlorine bleach or drain cleaners before or after hazardous waste is flushed down the drain.

Some materials cannot be poured down the drain, but can be set out for curbside trash collection for disposal in a sanitary landfill.

- **Hazardous wastes and their empty containers which must be taken to a hazardous waste collection center** or saved for collection on a designated community-wide, hazardous waste amnesty day.
- **Materials which are recyclable.**
- **Materials which can be set out for curbside trash collection for disposal in a sanitary landfill.**

Household Hazardous Waste Chart, continued

TYPE OF WASTE	POUR	TRASH	SAVE	RECYCLE
WORKSHOP				
Paintbrush cleaner with solvent			X	X
Paintbrush cleaner with TSP	X			
Aerosol cans (empty)		X		
Cutting oil			X	
Glue (solvent based)			X	
Paint (latex)	X			
Paint (oil based)		X		
Paint (auto)			X	
Paint (model)			X	
Paint thinner			X	
Paint stripper			X	
Paint stripper (lye based)	X			
Primer			X	
Rust remover (with phosphoric acid)	X			
Turpentine			X	X
Varnish			X	
Wood preservative			X	
GARDEN				
Fertilizer		X		
Fungicide			X	
Herbicide			X	
Insecticide			X	
Rat poison			X	
Weed killer			X	
MISCELLANEOUS				
Ammunition			X	
Artist's paints, mediums			X	
Dry cleaning solvents			X	X
Fiberglass epoxy			X	
Gun cleaning solvents			X	X
Lighter fluid			X	
Mercury batteries			X	
Moth bolls			X	
Old fire alarms			X	
Photographic chemicals (unmixed)			X	
Photographic chemicals (mixed, diluted)	X			
Shoe polish		X		
Swimming pool acid			X	

The Household Hazardous Waste Chart is based on information from the U.S. Environmental Protection Agency's Hazardous Waste regulations. The chart has been reprinted with the permission of the Water Environment Federation, formerly the Water Pollution Control Federation, 1987. Telephone: 1-800-666-0206.

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MacVicar Design and Communications
Marina Operators Association of America
Marine Retailers Association of America
Market Facts' TELENATION
SmithKline Beecham
U.S. National Ocean Service
U.S. National Oceanic and Atmospheric Administration**